



BHARAT HEAVY ELECTRICALS LIMITED,
Electroporcelains Division, Malleswaram,
Bengaluru - 560 012

TENDER
DOCUMENT
PART A

ANNEXURE : SOW

Tender Ref: BHEL/EPD/JC/MechMaint/17-19 Dated 29.09.2017
(This annexure is a part of the referred tender)

SCOPE OF WORK :: JOB CONTRACT FOR MECHANICAL MAINTENANCE 2017-19

ACTIVITY SL NO	(A) Mechanical maintenance of process equipments in Ceramic Insulator, Composite Insulator & CPBG Area
A1	MAINTENANCE OF SLIPHOUSE EQUIPMENTS: It includes preventive and breakdown maintenance of all the slip house equipments : screw pumps, 18 ball mills, scissor lifts, membrane pumps- 8, agitating top and bottom tanks, high speed and slow speed blunger, installation and modification of slip pipelines as required by production.
A2	MAINTENANCE OF PUG MILLS: Work includes preventive and breakdown maintenance of 9 no's of pug mills, reconditioning of vacuum pumps, replacement of primary and secondary chamber blades and screws, installation, repair and replacement of drive units, alignment, minor shifting of spares etc.
A3	MAINTENANCE OF TUNNEL DRYERS INCLUDING BDC & MDC : Work includes periodic monitoring and reconditioning of roller units, fabrication and installation of rails etc.
A4	MAINTENANCE OF VERTICAL LATHES: Work includes alignment and tool setting of vertical lathes, replacement of top fixtures, replacement of linear motion bearings, repair/ replacement of chuck unit bearings, jib and sliding unit alignment and setting, copying valve repair/ setting/ replacement, power pack reconditioning, balancing, wire rope monitoring and repair, shifting of lathes as required
A5	MAINTENANCE OF CONVEYORS: There are various conveyors being used in finishing wheel area, vertical lathe area, glazing area etc. Reconditioning/ replacement of gearbox, preventive and breakdown maintenance of conveyors, replacement of fastener, replacement of canvas belt, installation/replacement of polymer liners, guard fabrication, roller fabrication and fixing, drum motor reconditioning etc.
A6	MAINTENANCE OF DRY FINISHING WHEELS: Work includes daily monitoring and lubrication of finishing wheel, reconditioning/ replacement of shafts, repair of break unit, bush repair/ replacement etc.
A7	MAINTENANCE OF GLAZING BOOTHS: Work includes preventive and breakdown maintenance of glazing booths, change of spindles, repair/ replacement of stirrer unit, screw pump repair/ replacement, providing new glaze line connections as required by production, installation of Ferro magnetic filters, ball valve replacement, monitoring and maintenance of glaze pipelines, repair of rotating table, replacement of bearings, repair/ replacement of shaft unit, replacement of gearbox, replacement of V belts etc.
A8	MAINTENANCE OF KILNS: Work includes preventive and breakdown maintenance of all types of centrifugal; fans used in Kiln, like Combustion air fan, diffusion air fan, exhaust fans, turbo blower etc. ,various works involved in preventive maintenance of fans are replacement of bearings, alignment of couplings, balancing of the blowers, arresting leakage, thorough cleaning of fan casing, modification of waterline connections as and when required, duct repair etc. Other associated works include guard fabrication and installation, damper repair works, hydraulic power pack maintenance, maintenance of kiln doors, sliding door chain setting, cylinder reconditioning etc.
A9	MAINTENANCE OF TESTING MACHINES: Work includes preventive and breakdown maintenance of HVT Lab machines like vertical TMPT machine, universal testing machine, tensile testing machines, vertical and horizontal bend testing machine, porosity testing machine etc. Various works involved here are maintenance/ reconditioning/ replacement of gearbox, replacement of conveyors, drive unit reconditioning, hydraulic power pack reconditioning, diaphragm repair, vessel repair etc.
A10	MAINTENANCE OF PACKING MACHINES: Work includes preventive and breakdown of various packing equipments, wood cutting machines etc.
A11	MAINTENANCE OF SCISSOR LIFTS: Work includes regular monitoring and lubrication of scissor lifts, roller condition monitoring and replacement, bush replacement, reconditioning/ replacement of scissor arms, power pack monitoring and reconditioning, alignment and resetting etc.

A12	MAINTENANCE OF INJECTION MOLDING MACHINES: Work involves routing inspection, hose pipe replacement, hydraulic power pack reconditioning, online filtration of oil, replacement of oil after a specified time, reconditioning/ repair of CRB units, maintaining alignment of the sliding units, attending to various breakdown issues etc.
A13	MAINTENANCE OF CRIMPING MACHINES: Work includes preventive and breakdown maintenance of crimping machine, lubrication and cleaning of jaws, spring condition monitoring and replacement as and when required, hydraulic valve reconditioning.
A14	MAINTENANCE OF SHADE MAKING MACHINE: Work involves routing inspection, hose pipe replacement, hydraulic power pack reconditioning, online filtration of oil, replacement of oil after a specified time, maintaining alignment of the sliding units, attending to various breakdown issues etc.
A15	MAINTENANCE OF CERAMIC LAB EQUIPMENTS: Work includes preventive and breakdown maintenance of various ceramic lab equipments like pug mill, ball mill, vibrating machine etc.
A16	MAINTENANCE OF NEW PRODUCT MACHINERIES: Periodic maintenance of Isostatic press, reconditioning of hydraulic power pack, reconditioning/ replacement of intensifier units, checking/ replacement of hose pipes, maintenance of horizontal and vertical extruder units, maintenance of zigma mixer etc.
A17	MAINTENANCE OF MACHINES OF QUALITY DEPARTMENT: Work involves setting of various test beds and maintenance of machineries in quality department.
A18	MISCELLANEOUS MAINTENANCE WORKS: Work includes preventive and breakdown maintenance of all the machines not categorized above e.g. maintenance of cooling tower, maintenance of various canteen equipments, maintenance of CPBG Machines like bending and punching machines, Solid core jigs and fixtures, grinding lathes, cement mixing machines etc.
A19	INHOUSE DESIGN AND FABRICATION OF VARIOUS EQUIPMENTS: To assist in various inhouse development works like fabrication of mechanical pusher, installation of new conveyor, fabrication of rolling bed facility etc. as required by production. Work involves setting of components as per design, fabrication of items, alignment, installation and commissioning
ACTIVITY SL NO	(B) Mechanical maintenance of process equipments in Ceralin Area
B1	MAINTENANCE OF FILTER PRESS: Periodic maintenance of the power pack units, maintenance of the plunger pumps and hydraulic valves, reconditioning/ replacement of filter press ram nut and ram units, pipeline monitoring and alteration etc.
B2	MAINTENANCE OF MEMBRANE PUMP: Work includes preventive and breakdown maintenance of membrane pump, replacement of diaphragm, reconditioning of ball seating, reconditioning of gearbox, shaft units etc.
B3	MAINTENANCE OF INTENSIVE MIXER: Work involves reconditioning of outlet gate, seals replacement, blade reconditioning and replacement, power pack reconditioning etc.
B4	MAINTENANCE OF DISINTEGRATOR MACHINE: Work involves regular monitoring and lubrication, bearing replacement, guard reconditioning, SS blade replacement, Pulley replacement etc.
B5	MAINTENANCE OF SPAY DRYER: Work involves regular monitoring and lubrication, exhaust duct periodic cleaning and fabrication, glazing stirrer repair, roto pump reconditioning etc.
B6	MAINTENANCE OF RAW MATERIAL LOADING CONVEYOR: There are various conveyors being used in finishing wheel area, vertical lathe area, glazing area etc. Reconditioning/ replacement of gearbox, preventive and breakdown maintenance of conveyors, replacement of fastener, replacement of canvas belt, installation/replacement of polymer liners, guard fabrication, roller fabrication and fixing, drum motor reconditioning etc.
B7	MAINTENANCE OF HYDRAULIC PRESSES: Work includes preventive maintenance of hydraulic presses, online filtration of hydraulic oil, cleaning of power pack and hydraulic oil replenishment, hydraulic valve resetting/ reconditioning/ replacement, replacement of axial pumps and vane pumps, inspection and replacement of hydraulic pipelines, pressure adjustment, lubrication of the sliding units, axial and vane pump repair, radiator cleaning and repair etc.
B8	MAINTENANCE OF MULTISTATION TABLET MAKING MACHINE: Work involves regular lubrication, alignment setting, bearing replacement, Belt and drive unit condition monitoring etc.
B9	MAINTENANCE OF SINGLE STATION TABLET MAKING MACHINE: Work involves regular lubrication, V belt and motor replacement, sliding unit reconditioning/ replacement etc.
B10	MAINTENANCE OF SCISSOR LIFTS: Work includes regular monitoring and lubrication of scissor lifts, roller condition monitoring and replacement, bush replacement, reconditioning/ replacement of scissor arms, power pack monitoring and reconditioning, alignment and resetting etc.
B11	MAINTENANCE OF LOADING WAGONS: Fabrication, bearing replacement, wheel replacement, alignment etc.

B12	MAINTENANCE OF KILNS AND ASSOCIATED HYDRAULIC POWER PACK: Work includes preventive and breakdown maintenance of all types of centrifugal; fans used in Kiln, like Combustion air fan, diffusion air fan, exhaust fans, turbo blower etc. various works involved in preventive maintenance of fans are replacement of bearings, alignment of couplings, balancing of the blowers, arresting leakage, thorough cleaning of fan casing, modification of waterline connections as and when required, duct repair etc. Other associated works include guard fabrication and installation, damper repair works, hydraulic power pack maintenance, maintenance of kiln doors, sliding door chain setting, cylinder reconditioning etc.
B13	MAINTENANCE OF TILES CUTTING MACHINE: Work includes preventive and breakdown of tiles cutting machine, replacement of V Belts, water line connection checking and repair, fabrication and installation of guards, bearing replacement, replacement of V belts, table setting and alignment etc.
B14	MAINTENANCE OF TEST BED: Work includes spirit level checking and alignment of testing beds, modification of testing beds etc.
ACTIVITY SL NO	(C) Maintenance of SPV Utility equipments – HT, LT Panels, UPS, HVAC system and Compressors
C1	MAINTENANCE OF SPV COMPRESSOR PACKAGE : Work includes regular monitoring of various control devices like auto drain valve and thermodynamic steam traps, draining of the filters, periodic cleaning of the filters, suction filters, greasing of motors, air dryer radiator cleaning, drain line condition monitoring and cleaning, monitoring of compressor for refrigerant leakage, Y-strainer periodic cleaning, compressor inside chamber cleaning, assisting in certification of pressure vessels etc.
C2	MAINTENANCE OF SPV CENTRALIZED AC PACKAGE: Work includes regular monitoring and recording readings periodically, checking belt tightness, replacement of damaged/ loose belts, tightening of split couplings, periodic fine filter cleaning, damper condition monitoring, ODUB regular cleaning, attending various breakdown issues, Checking of Loose connections at the motor terminals & tightening, Checking & tightening the terminal connections in control Panels, replacement of bearing of motors etc.
C3	MAINTENANCE OF COMPRESSOR ROOM: Work includes daily cleaning and sweeping of the room, cleaning of the louvers with compressed air etc.
C4	MAINTENANCE OF COMPRESSED AIR LINE: Work includes periodic monitoring of compressed air network for any leakage, checking tightness of the fittings, providing new compressed air line wherever required.
C5	MAINTENANCE OF CENTRALIZED AC - AHU ROOM: AHU room regular cleaning and sweeping.
C6	MANTENANCE OF AIR SHOWERS: Work includes fastener tightening, tightening of starter terminals, cleaning of contactors, motor bearing replacement, blower balancing, cleaning of dust filters, replacement of motor V belt, repair of biometric sensing machine etc.
C7	MAINTENANCE OF AIR CURTAINS: Work includes fastener tightening, tightening of starter terminals, cleaning of contactors, motor bearing replacement, blower balancing etc.
C8	MONITORING OF Main LT Panel Incomer, Compressor feeder, UPS Feeders, AHU Feeder.
C9	MAINTENANCE OF SPV LT & HT PANELS: Work involves Noting down the Current readings of Main LT Panel Incomer, Compressor feeder, UPS Feeders, AHU Feeder, Checking the terminations of MCCBs, ACBs for tightness, Replacement of MCBs of control panels, Checking of Control Panels for loose connections & tightening, SPV LT & HT panel rooms cleaning work, Replacement of MCCBs, ACB Drawouts in LT panels, maintaining the earth pits etc.
C10	ASSISTING IN TROUBLE SHOOTING OF SPV MACHINERIES BREAKDOWN: Assisting in resolving various SPV machine breakdown as and when required.
ACTIVITY SL NO	(D)Maintenance of Cranes and Hoists
D1	MAINTENANCE OF OVERHEAD CRANES: Work involves Periodic lubrication, checking for leakage of Seals & Covers, Tightening of Fasteners, Checking for Alignment of CT & LT Wheels ,Checking of DSL System/ Trailing cable system, Replacing the worned out Brushes for DSL System, Checking of Control Pendent for loose connections & tightening, Checking of Guy wire of control pendent, Checking of Loose connections in the electrical control panel & tightening, Checking the Hook & Latch for wear out, Checking the Wire rope for wear out & replacement. There are 32 overhead cranes, 2 lifts and Hoists that are to be maintained and reconditioned from time to time
D2	PERIODIC MAINTENANCE AND CERTIFICATION OF OVERHEAD CRANES: Work involved preventive maintenance as per schedule and assisting competent third party in inspection and certification of the Overhead cranes.
ACTIVITY SL NO	(E)Turning, Machining, Cutting, Forging, Tools making and Fabrication works in Workshop and Tool filing shop to meet requirements of all sections

E1	<p>TURNING WORK: ÉTurning shaft of various sizes from 5mm dia to 150mm dia, ÉTurning of Aluminum bronze profile dies to drawings, ÉTurning, fixing & boring Gun metal bushes ÉBoring, thread cutting & Turning various machine spares of different profiles, sizes and materials like Steel, Cast iron, Brass, Aluminum bronze, Gun metal, Nylon, Wood, etc. ÉCleaning and lubricating the machineries daily. ÉHelp others whenever required Skill Required ó Should able to perform the following operation Turning, Drilling, Thread cutting, Tapping, etc on LB 20 lathe having swing 400mm dia and of 1500mm Bed length, Lathe having swing 900mm dia and of 2000mm Bed length, Kirloskar lathe having swing 500mm dia and of 2500mm Bed length with tool ,drill bit, etc grinding for the above operation. Accuracy of job - ± 0.01</p>
E2	<p>MACHINING WORK ÉDifferent types of Gearing (spur gears, Helical gears, worms, rack, etc) cutting, using milling m/c ÉDifferent size of internal & external key ways, using milling & slotting m/c ÉSurface milling, Surface Planning, dove tails, machining using dividing head, etc using milling & planning m/c ÉDrilling, boring, spot facing, tapping, reaming, using drilling m/c. ÉShould change milling attachment & cutters, Clean & Lubricate the M/c. ÉHelp others whenever required Universal milling m/c-Table size 1100x275mm, Vertical traverse-365mm Vertical m/c- Table size 1000x300mm, Vertical traverse-300mm Slotting m/c- Table size 600Ø, Vertical height 300mm Planning m/c- Table size 2480x760mm, Vertical height 800. Radial drilling- Arm length 700mm, Vertical height 700mm. Accuracy of job - ± 0.01</p>
E3	<p>FABRICATION WORKS ÉWelding MS, Steel, SS, Cast Iron, Special welding electrode, Aluminum, Brass using Arc & Gas welding ÉGas cutting MS Plate 6 to 100mm thickness ÉGrove cutting, gouging using Arc welding ÉBrazing, soldering, tinning. ÉCasting white metal bearings ÉTinkering & sheet metal works ÉFabrication of ducts, cones, structural etc ÉHelp others when ever required Skill Required ó Should able to perform the above operation & make templates for cones, taper duct, etc, Should able to operate the Diode type, transformer type, generator type arc welding m/c and oxygen & acetylene gas plant.</p>
E4	TOOL & FILING JOBS : Making of various tools, template making works, various grinding machining works, making of cutters, cleaning equipments as required by all the production departments
E5	SMITHY WORK : Forging of tools, hooks etc. for further processing in tool and filing shop
E6	MATERIAL CUTTING WORKS: Cutting of EN-8, EN-19 Shafts of various diameters, plate cutting etc for further processing like turning, machining, grinding etc.
ACTIVITY SL NO	(F) Maintenance of Steam lines, Compressed Air lines, Centralized & Portable Compressors, Hot Air generator, TFD and Canteen works by Boiler & Compressor Maintenance section
F1	MAINTENANCE OF STEAM LINE, TFD, HAG, CANTEEN EQUIPMENTS: Work involves installation of ball valve, providing new connections, regular monitoring and prevention of steam leakage, maintenance of canteen cookers, maintenance of water softener plant, removal of redundant lines, repair of IBR Boiler spares, assisting in yearly license renewal of the IBR boilers by Boiler inspector, maintenance of thermic fluid heaters and Hot air generators etc
F2	MAINTENANCE OF COMPRESSED AIR LINE: Regular monitoring and prevention of compressed air leakage, providing new compressed air connection, removal of redundant compressed air lines, replacement of various spares as and when required.
F3	MAINTENANCE OF CENTRALIZED COMPRESSORS: Work involves periodic monitoring and lubrication of the centralized compressors, condition monitoring of compression units as well as heat exchangers and receivers, replacement of various spares as and when required, inventory management for spares, assisting in inspection and certification of pressure vessels by competent authority.
F4	MAINTENANCE OF PORTABLE COMPRESSORS: Work involves periodic monitoring and lubrication of all the portable compressors located in various production shops in the factory, condition monitoring of compression units as well as heat exchangers and receivers, replacement of various spares as and when required, inventory management for spares, assisting in inspection and certification of pressure vessels by competent authority.

Note: Consumables required for the above mentioned works will be provided by BHEL

Skills required for above mentioned works	SSW	SW	FITTER	WELDER	TURNER	MACHINIST	ELECTRICIAN	MECHANIC
Estimated manhours required as per Estimate ref: BHEL/EPD/JC/Mech Maint/17-19	20600	31000	22800	28450	10000	5000	34400	11000
Min No of workers to be engaged against skillset	4	6	4	5	2	1	6	2
Minimum Daily wage to be paid to the CL*	576.32	604.48	651.71	651.71	651.71	651.71	651.71	699.65
Minimum Holiday wage to be paid to the CL**	466.46	485.54	526.87	526.87	526.87	526.87	526.87	574.81

I. GENERAL INSTRUCTIONS:

1. * Gross daily minimum wage is the expenditure per person per day for 8 hours of work. This includes minimum wage payable to each labourer, attendance bonus, travelling allowance, PF & ESI contributions. It is exclusive of contractor margin and other overhead expenses.
2. ** Gross paid holiday/leave wages per person is the minimum wages payable to each laborer on paid holiday/leave excluding contractor margin and other overhead expenses
3. Increase/ decrease of wages as per government instruction will be applicable and is the scope of contractor
4. Wages for working hours over and above 8 hours of work is as per government instructions and is to be paid by the contractor
5. Working Hours: 6:00am to 2:00pm for 1st Shift and 2:00pm to 10:00 pm for 2nd Shift or 8 am to 4.30 pm or any other shift prevailing in the factory. All will be required on all working days of the week.
6. In case of emergencies, the work is to be attended on Sundays and Holidays also.